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Company

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REFUELING WATER STORAGE TANK LOW LEVEL BACKUP ALARM COMMITMENT CHANGE SALEM GENERATING STATION UNIT NO. 1 DOCKET NO. 50-272

Ladies and Gentlemen:

Public Service Electric and Gas (PSE&G) submitted a letter to the NRC on April 7, 1980, concerning the setpoints for the Refueling Water Storage Tank (RWST) level alarms. In this letter, PSE&G stated the following:

> "A backup low-level alarm will be provided to alert the operators to low tank level in the event the normal low-level alarm fails or is disregarded. The setpoint for this alarm will be at 119,000 gallons (measured from the tank bottom). Placing the alarm at this location allows an adequate volume between the two low-level alarms to preclude any possibility of coincident alarms caused by instrument error. An adequate time delay will exist between the two alarms.
>
> The alarm will be set high enough in the tank to allow the operator to change over from injection to recirculation prior to depleting tank volume..."

The NRC reflected the above information in their review of the RWST capacity in Supplement 4 to NUREG-0517 [Safety Evaluation Report (SER) for Salem], dated April 18, 1980. Supplement 4 of the SER states that, "a backup alarm will also be provided at a water level of 119,000 gallons."

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Background

The initial design for Unit 1 RWST level alarms had both trains of low level alarms connected to a single annunciator window. As such, a concern arose that a failure of the single annunciator circuit would have prevented the operator from receiving the RWST low level alarm. Additionally, with a single RWST low level alarm, and multiple operator activities during an accident situation, the possibility also existed that the

operator might be distracted by other activities in the control room when the low level alarm was actuated. This may have caused the operator to miss the alarm and therefore not be able to switch the emergency core cooling (ECCS) pumps to take suction from the containment sump prior to depleting the inventory in the RWST.

A meeting was held with the NRC on February 25, 1980 to discuss the RWST level setpoints. As a result of this meeting, PSE&G committed to add an RWST low level backup alarm with a separate annunciator window (as described earlier). Additionally, PSE&G stated that the setpoint for this new backup alarm would be located such that any possibility of coincident alarms, caused by instrument error, would be precluded. The RWST low level alarm would be set at 150,500 gallons, and the back-up low level alarm would be set at 119,000 gallons. Based on the 1980 RWST draindown analysis, the setpoint of 119,000 gallons for the back-up alarm provided adequate volume to complete switchover.

As stated above, the 1980 analysis established the low backup alarm to provide 119,000 gallons of RWST water. Based on estimates of pump runout flows for ECCS pumps as well as estimated times to complete procedural manipulations of ECCS pumps and valves during a LOCA, an RWST inventory of 119,000 gallons provided sufficient time (in excess of 15 minutes) for the operator to manually complete switchover.

Current Status

Reviews of the 1980 draindown analysis, starting in the 1995-96 timeframe, revealed that a number of changes had taken place since the 1980's that challenged switchover completion times. For one, the actual pump flowrates for the RHR and Containment Spray pumps were greater than originally used. Procedurally, steps had been changed and the addition of three point communication had increased the amount of time to complete the switchover procedure. The affect of these changes to the RWST draindown analysis were reported to the NRC in LER 272/97-009. Also, updated instrument inaccuracies reduced the amount of measurable "available" inventory.

The Salem Unit 1 RWST draindown analysis is currently being re-evaluated, similar to the effort conducted to support the restart of Unit 2, as part of the corrective actions documented in LER 272/97-009. Should the RWST low level alarm fail, the low level back-up alarm setpoint (based on no overlapping of the low and low back-up level alarms after considering inaccuracies), provides for an available volume of approximately 89,000 gallons. Based on current procedure steps and maximum flowrates, the RWST volume at the low level back-up alarm provides the operators with approximately 8.6 minutes to complete the switchover to recirculation under worst case

scenarios. This critical evolution time provides no margin for variations in operating crew responses.

As a result of the above, PSE&G proposes to change the commitment for the RWST low level back-up alarm to allow additional margin for operators to complete the switchover procedure. PSE&G is revising the commitment to move the RWST low level backup alarm setpoint to the same level as the existing RWST low level alarm setpoint. This would provide for coincidental alarms on RWST low level. Though this is contrary to the overlapping alarm concern raised in the 1980 timeframe, changing the commitment is acceptable based on the following:

- A review of the current indication and alarm circuitry for the RWST low level back-up alarm shows that this alarm signal is separate from that of the low level alarm. A failure of either the back-up alarm or the low level alarm circuitry does not preclude the other alarm from actuating.

- The initial commitment to add a back-up alarm was based on 1980 (pre-EOP) Salem emergency response procedures. With the development of the current prescriptive EOP's and the extensive training associated with these procedures, the opportunity for Operator error is highly unlikely particularly an error of missing key alarms/indications such as this alarm. Operators are trained to strictly follow the steps prescribed in the EOP.

  EOP-LOCA-3, "Transfer to Cold Leg Recirculation," is a critical procedure. Operators are trained on the importance of the transfer to recirculation procedure, with the critical transition point of low level in the RWST. Operators monitor the RWST level as an important trending parameter in reactor trips and potential accident scenarios. They are trained to transition quickly to the LOCA-3 procedure at the RWST low level alarm (or indication of low level). The receipt of the RWST low level alarm is a "Continuous Action Statement" in the EOP's that is monitored by the Operators in the control room. The RWST low level backup alarm, although available, is not used as a parameter for Operator action in the EOP's.

- Setting the RWST low level back-up alarm to the same setpoint as the low level alarm continues to provide redundancy of this alarm function while eliminating the potential penalty to the Operator, with respect to the volume of RWST inventory (and time) available to complete switchover, should the RWST low level alarm fail.

Recent simulator validation runs of the Unit 1 EOP-LOCA-3 procedure indicate the operators can complete switchover in approximately 8.6 minutes. By analysis, the time available for switchover, based on starting at an RWST low level setpoint of 15.2 feet

(including a limiting single failure) is approximately 11 minutes. Thus moving the RWST low-level back-up alarm to the same level provides an additional 2.5 minutes of margin to the operator for completion of the switchover.

Based on the above, PSE&G has concluded that moving the RWST low back-up alarm setpoint to the same level as the existing RWST low level setpoint retains the separate redundant alarms for RWST low level while providing the necessary volume of water in the RWST to successfully complete the switchover. Therefore, PSE&G is revising our commitment to state that the RWST low level back-up alarm will be set at the same level as the existing RWST low level alarm for Salem Unit 1.

If you have any questions concerning the above information, please do not hesitate to contact us.

Sincerely,

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